HIGHLIGHTS ARCHIVE

NASA SimLabs News
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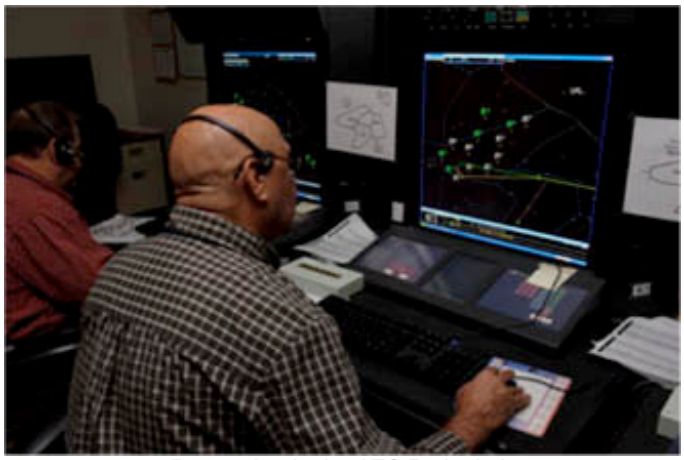
1. Evaluation of the Trajectory-Based Automation System


Researcher in the ATC Radar Lab

A simulation evaluation of a near-term concept for Trajectory-Based Operations (TBO) with air/ground datalink communication was completed this past October at NASA Ames in the Crew-Vehicle Systems Research Facility (CVSRF). The simulation investigated whether a trajectory-based automation system that solves traffic conflicts, time-based metering problems, and weather-avoidance problems in an integrated fashion, with air/ground datalink communication, can produce substantial benefits for the National Airspace System. Thirty-one hours of simulation runs were conducted over 12 days and utilized SimLabs' distributed simulation environment, integrating the Advanced Concepts Flight Simulator, the Boeing 747-400 flight simulator, and the Air Traffic Control Radar Laboratory. A number of enhancements were made to the existing simulation environment to enable simultaneous display of weather information to the cockpit systems and en route sector displays. Eleven recently-retired controllers from Fort Worth Center and 12

pilots familiar with current integrated Flight Management System (FMS)/datalink operations participated in the simulation, which provided rapid-feedback trajectory automation at the Center radar controller position and currently operational capabilities for two-way air/ground datalink communication integrated with the FMS. Preliminary data analysis shows that higher proportions of datalink-equipped aircraft reduce controller workload, which allows the controllers to provide more efficient flight plan reroutes and to respond to aircraft requests more quickly using the new trajectory automation features. Results of this simulation will be used to enhance the system's functionality in preparation for a follow-on simulation planned for Spring 2011.

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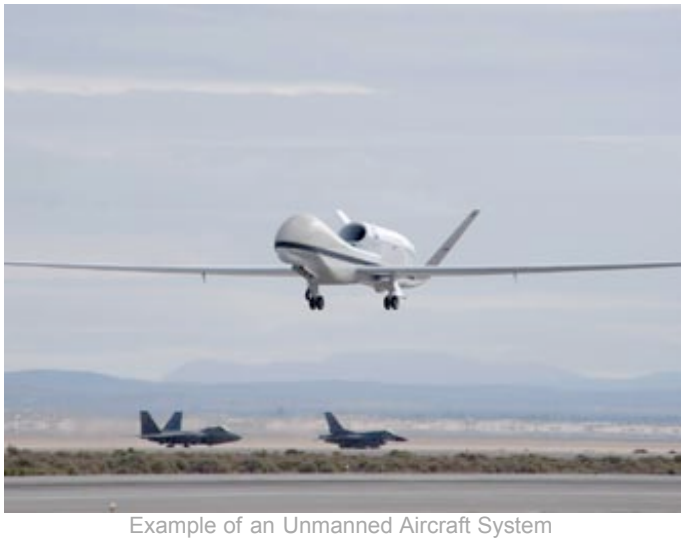
2. Navy Broad Area Maritime Surveillance System Simulation



Example of an Unmanned Aircraft System

SimLabs completed the second in a series of distributed controller-in-the-loop simulations at NASA Ames' Crew-Vehicle Systems Research Facility in October 2010. The simulations investigated the integration and safe operation of the US Navy's Broad Area Maritime Surveillance (BAMS) Unmanned Aircraft System (UAS) in the National Airspace System (NAS) and allowed researchers to examine BAMS collision avoidance displays and processes in a highly realistic Instrument Flight Rules (IFR) and oceanic air traffic environment. The experiment leveraged the Live-Virtual-Constructive Distributed Environment infrastructure of five networked facilities across the US that was developed during last year's BAMS experiment. The BAMS mission control station, located at the Northrop Grumman facility in Bethpage, NY, “flew” the BAMS UAS in an offshore IFR and oceanic air traffic environment off the East Coast of the US; the environment was modeled and simulated at SimLabs. Navy command and control aircraft, as well as “encounter” traffic, were simulated at NAS Pax River, MD, while real-time data analysis took place at Wright-Patterson Air Force Base, OH. A cross-domain solution located at Redstone Arsenal, AL, enabled the distributed simulation to occur simultaneously at two different levels of security classification. SimLabs provided airspace and air traffic models, tailored oceanic air traffic control displays, ARINC operator interfaces, and air traffic controllers and pseudo-pilots. Following three integration activities to test the simulation and scenarios, a formal four-day simulation with humans-in-the-loop was conducted. Future BAMS experiments will continue to leverage SimLabs facilities, including the B747-400 simulator, to answer questions related to equipping UAS with Automatic Dependent Surveillance-Broadcast and Traffic Collision Avoidance Systems.

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3. NASA Recovery Act Funding Supports Upgrades to FutureFlight Central

ATC staff conducting a simulation in FFC

Earlier in the year, NASA funded an American Recovery and Reinvestment Act task to upgrade the FutureFlight Central (FFC) facilities to meet future requirements for the Safe and Efficient Surface Operations (SESO) research activity of NASA's NextGen/Concepts and Technology Development (CTD) project. To date, the entire network in the facility has been upgraded to Gigabit Ethernet, and the network has been reconfigured to provide better connectivity to the other SimLabs networks, including gateways to other NASA networks and the Internet. Twenty-seven new workstations and a new high-performance file server were integrated to support a variety of flight and Air Traffic Management simulation tools for both surface and airborne operations. Additional high-resolution video distribution has been added to allow researchers to remotely observe simulation computer screens without disturbing the active simulation participants in the lab.

Looking beyond the initial needs of the SESO research activity, this project is providing FFC with a high-performance, general-purpose computing and networking environment supporting both Linux and Windows systems that can be seamlessly integrated with the existing image generation and visualization capability in FFC. The performance of the internal network has been significantly increased, and the connectivity to entities outside of FFC has been substantially improved.

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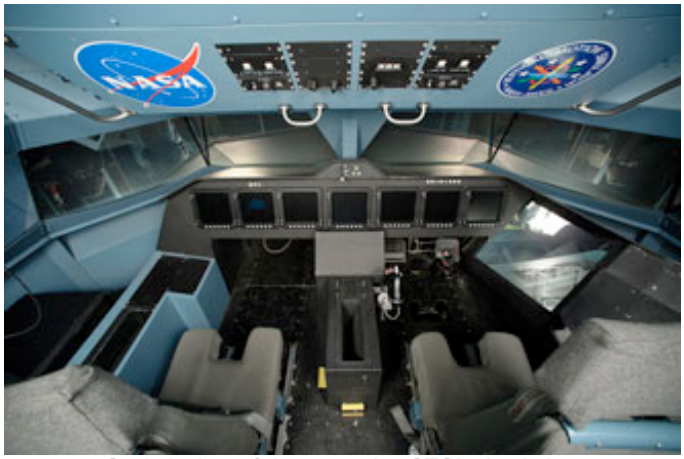
4. Short Take-Off and Landing Simulation


Cockpit view of the upcoming STOL simulation

A simulation of a Short Take-Off and Landing (STOL) Mobility Aircraft is schedule for Spring of 2011. The STOL simulation will be a flight-dynamics-based handling qualities experiment. The experiment will be comprised of two parts: a three-week experiment dedicated to pursuing simulation goals, and a two-week experiment dedicated to a NASA Aeronautics Research Mission Directorate (ARMD) simulation goal. In particular, the simulation goal is to understand the aircraft's handling qualities, evaluate the baseline flight control system, assess the subsequent field length performance, and inform flying quality requirements for future vehicles of this class. The NASA ARMD simulation goal is to assess the ability of an innovative control system to reduce design requirements for a next generation aircraft in a manner that improves system efficiency with minimal impact on performance, Handling Quality ratings, and Pilot-Induced-Oscillations ratings.

Both portions of the experiment will use a similar or identical aircraft math model, head-down display, out-the-window view, and hardware. Additional control algorithms and vehicle modifications will be integrated into the baseline aircraft math model and flight control system for the NASA portion of the experiment. Evaluation tasks will include visual take-offs, approach and landings with guidance, and high-speed operational navigation scenarios.

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5. Thinking of Doing Business with NASA SimLabs?

For more information on what we can do for your needs, contact:

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